

**EGYPT
MANAGEMENT INFORMATION SYSTEMS FOR POPULATION AND
HEALTH**

By:

Mary Church
Clifford Olson

Submitted by:

LTG Associates, Inc.
and
TvT Associates, Inc.

Submitted to:

The United States Agency for International Development/Egypt
Under Contract No. HRN-I-00-99-00002-00

June 2001

Assessment of the Health Policy Support Program's Management Information System, was prepared under the auspices of the U.S. Agency for International Development (USAID)/Egypt under the terms of the Monitoring, Evaluation and Design Support (MEDS) project, Contract No. HRN-I-00-99-00002-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of LTG Associates, TvT Associates, or USAID.

Information about this and other MEDS publications may be obtained from:

Monitoring, Evaluation and Design Support (MEDS) Project
1101 Vermont Avenue, N.W., Suite 900
Washington, DC 20005
Phone: (202) 898-0980
Fax: (202) 898-9397
scallier@medsproject.com

ACRONYMS AND FOREIGN TERMS

BTS	Budget tracking system
CCO	Curative Care Organization
CDC	Centers for Disease Control and Prevention
CEAS	Cost effectiveness analysis system
CEED	Controlling Emerging and Endemic Diseases
CIDSC	Cabinet Information and Decision Support Center
CRHP	Cost Recovery for Health Project
CSI	Clinical Services Improvement
DDM	Data for Decision Making Project
DMT	District management team
DOS	Disk operating system
DT2	Development/Training 2
EIS	Executive information system
EPTC	Egyptian Pharmaceutical Trading Company
FHF	Family Health Fund
GIS	Geographical information system
HIO	Health Insurance Organization
HIS	Health information system (NICHHP name for MHIS)
HMHC	Health Mother/Healthy Child
HMIS	Hospital management information system
HPSP	Health Policy Support Program
JSI	John Snow, Incorporated
ICD	International Classification of Diseases
ICL	International Computers Limited
IDC	Information and Documentation Center
IEC	Information, education, and communication
IR	Intermediate Result
LAN	Local area network
LE	Egyptian pound
MIS	Management information system
MHIS	Management health information system (HMHC name for HIS)
MOHP	Ministry of Health and Population
MS	Microsoft
NGO	Nongovernmental organization
NICHHP	National Information Center for Health and Population
NTL	National Technology Laboratory
PBS	Patient-based system
PHR	Partnerships for Health Reform project
PRS	Performance Reporting System
POP III	Population/Family Planning/Reproductive Health III
POP IV	Population/Family Planning/Reproductive Health IV
RCT	Regional Center for Training
SDP	Systems Development Project
SO	Strategic Objective
SOW	Scope of work
SQL	Structured query language
TSO	Technical Support Office
USAID	United States Agency for International Development
WB	World Bank

CONTENTS

ACRONYMS AND FOREIGN TERMS

EXECUTIVE SUMMARY	i
-------------------------	---

I. Introduction	1
-----------------------	---

A. Background	1
---------------------	---

II. Implementation Activities: Objectives, Progress, and Current Status	3
---	---

A. Rationalize Health Services: Family Health Fund	4
--	---

B. Information Infrastructure: MOHP	7
---	---

C. Technical Support Program	11
------------------------------------	----

D. Information Infrastructure: Hospitals	15
--	----

III. Issues and Criteria	19
--------------------------------	----

A. Use of Information	20
-----------------------------	----

B. Sustainability	25
-------------------------	----

C. Replicability	26
------------------------	----

D. Compatability	27
------------------------	----

E. Cost	28
---------------	----

F. Coordination	29
-----------------------	----

IV. Recommendations	31
---------------------------	----

A. Immediate Needs	31
--------------------------	----

B. Medium-term Activities	35
---------------------------------	----

C. Long-term Activities	36
-------------------------------	----

ANNEXES

A. Persons Contacted	41
----------------------------	----

B. References	45
---------------------	----

C. Scope of Work	51
------------------------	----

D. Recommendation Matrix	59
--------------------------------	----

EXECUTIVE SUMMARY

Over the last five years the Population and Health Office of the United States Agency for International Development's Mission in Egypt (USAID/Egypt/PH) has expended more than \$35 million on information systems. These funds have supported independent systems for facility management, maternal and child health, family planning, and health sector reform activities. They have been used for the procurement of technology, long-term resident advisors, and short-term technical assistance visits. While there are examples of these systems improving health service, overall the outcomes have not yet justified the magnitude of the expenditure.

The challenge now, as USAID plans to phase out its sector assistance, is to convert these investments into measurable impact. This can be achieved by emphasizing the following two principles:

1. Improve the link between information systems and management applications. The information is only worth the cost of collection, analysis, and dissemination when it leads to improved planning, more efficient financing, and better monitoring and supervision, which combine to produce improvements in quality of care and patient outcomes.
2. Maximize synergy. Independent USAID-funded information systems often exist within the same institution—sometimes without the ability to communicate. These problems can be resolved.

This is not the time to fund the design of still more information systems. It is better to fix what we have, make them compatible, facilitate replication, stimulate their use, and—most importantly—address the issue of sustainability.

Sustainability means converting what have historically been donor activities into behaviors routinely executed by Egyptians. First and foremost it means ownership. In each case, the appropriate Egyptian organization must assume the role of guiding the transitions. Design revisions and implementation plans will come from decision-makers in Egypt, not home offices in the U.S. Beginning now, and without exception, technical support must come from Egyptian organizations. If an information system investment cannot be sustained locally, technically, and financially, it should not be done.

Information systems supporting health sector reform must proceed toward two parallel but not unrelated objectives: (1) strengthening decentralized decision-making, and (2) supporting innovations in health care financing. USAID should support both and should assure that the two complement each other.

Information system activities that will support decentralization include:

- Integration of the use of information for management purposes at each level: provider, facility, district, governorate, and national. The integrated use is based on existing data. It does not require new data collection methods.
- A single computer or network should support automated applications in a single institution. This facilitates consolidation of information in support of integrated management decisions for patients and institutions. Multiple stand-alone computers with different software platforms in a single institution encourage further bifurcation of service delivery. And, they are more difficult and expensive to support.
- All information systems activities should include training in how to use the information to support informed microplanning and budgeting. The simple aggregation and reporting of data is an insufficient justification for introducing automation.
- The district is the place to encourage information use that supports decentralization. This is not a process that begins at the top. Decentralization is achieved when districts use information to “take charge.” Central level authorization follows in due course.
- District health management for the entire community will require inclusive information. Information from hospitals must be joined with information from health centers and health units. The Ministry of Health and Population (MOHP) information must be joined with information from the Health Insurance Organization (HIO) facilities. Ideally, information from nongovernmental organizations (NGOs) and the private sector will be incorporated as well. This is an ambitious task that must begin at the district level. While the task may not be completed before USAID’s phaseout, initial steps can be taken.

Information system activities that will support innovations in health care financing include:

- The MOHP’s Technical Support Office (TSO) is introducing new health care and financing models, with support from three main donor organizations: USAID, the European Commission, and the World Bank. These models rely on detailed information to rationalize care and financing.
- The new models represent initial steps towards the separation of purchasers and providers of health care. It is essential to articulate the strengths and weaknesses of the models. Information systems are essential for ongoing monitoring, evaluation, and refinement of the models.

- As the mechanisms for separation of purchaser and provider institutions become more clearly delineated, and with the anticipated passage of enabling insurance legislation, there will be a need for detailed actuarial provider-side information and financial management systems for the insurance funds. The National Technology Laboratory (NTL), to be housed at the HIO, is likely to be home to these systems and anticipates assistance from the World Bank. Nevertheless, USAID has a key role in assuring a seamless transition from pilot activities to nationwide rollout.

The management information system (MIS) review team has grouped its recommendation into three broad categories:

- Immediate needs—complete and coordinate ongoing activities.
- Medium term—activities for the next 12–18 months, to promote uniform standards and district level automation.
- Long term—activities to support long range goals of the MOHP: decentralization and innovative financing.

Immediate Needs

Complete Health Policy Pilot Systems

- The TSO intends to replicate the patient-based system (PBS) at Abu Qir. First, it needs to work correctly and have local technical support. USAID should contract with a local source to reengineer the system, under the supervision of TSO, for ongoing maintenance by HIO.
- The Alexandria performance reporting system (PRS) will also be replicated. It also needs to work correctly, with the required functionality. USAID should contract with a local source to redesign and implement the system, under the supervision of TSO, for ongoing maintenance by the HIO.
- In coordination with MOHP and other donors, USAID should support the procurement of information technology for replication of the systems at pilot sites in Alexandria, Menoufiya, and Sohag.

Complete Hospital MIS

- Complete contract on schedule.
- Match MOHP commitment to budget and staff for ongoing maintenance with local technical assistance for transfer of ownership.

Coordinate USAID/Population and Health Projects' Information Systems Activities

- Prohibit duplicate or incompatible equipment at the same sites.
- Set and enforce software development guidelines in collaboration with partners in USAID-funded MIS activities.
- Consolidate information technology support provided by partners in USAID-funded activities.

Medium Term

Facilitate Establishment of Information Standards

- Coding systems for diseases, pharmaceuticals, medical supplies, etc.
- Standards for software and database development and for data transfer.

Reengineer Health Information System (HIS) and Rollout to Remaining Districts

- Use existing data collection instrumentation; do not redesign.
- Use local technical assistance for software development and support. A plan for ongoing maintenance should be part of the initial development plan.
- Include hospital data, HIO data, and health policy pilot data.

Long Term

Strengthen District Use of Information for Management

- Reinforce existing systems; do not create new ones.
- Involve district management teams in new financing models.

Support Financing Models that Lead to Purchaser Provider Separation

- Use local experts for system development and support.
- Include modules for facility management, self-monitoring and evaluation, and reporting through the HIS.

Investments in Information Technology

- Do not invest in data warehousing. This is a specialized operation that is often outsourced to large, technically sophisticated corporations in Europe and North America.

- If large information technology investments are contemplated, invest in HIO patient and facilities management. Such investments should be closely coordinated with World Bank support of the NTL.

MIS Benchmarks Must Reflect Outcomes Rather than Modules

- Information systems are not a procurement item, they are a dynamic service. The benchmarks should reflect functionality, not the existence of a specific module.

I. INTRODUCTION

A. BACKGROUND

This management information system (MIS) assessment has been conducted upon impending completion of the United States Agency for International Development's Mission in Egypt's (USAID/Egypt) Health Policy Support Program (HPSP). An assessment of the policy aspects of HPSP was conducted concurrently and in parallel to this assessment. The scope of work for this MIS assessment extends beyond those MIS activities funded under HPSP. It focuses on the relationships, capacities, and incompatibilities between the MISs designed to support USAID-funded health and population assistance activities.

This assessment coincides with USAID/Egypt's shift to its new Strategic Plan (2000–2009). This plan calls for a final period of sector assistance in health and population. The new strategy brings what had been two distinct Strategic Objectives (SO) into a single SO 20: “Healthier, Planned Families.” The following are the three complementary Intermediate Results:

1. Increased use of family planning, reproductive health, and maternal and child health services by target populations;
2. Healthy behaviors adopted; and,
3. Sustainability of basic health services promoted.

The team paid particular attention to the bridging activities required to shift the previously vertical approaches into integrated systems more likely to achieve the new Intermediate Results. Given the anticipated phaseout of sector assistance, sustainability proved a key issue throughout.

Key questions in the scope of work included a retrospective review of the principle objectives of MIS investments, the appropriateness of hardware and software, identifying possible economies of scale, potentials for sustainability, the advantage of autonomous systems, the role of other donors, needs for shared information, and thoughts on future development of USAID funded MIS activities. The MIS team's scope of work is included as annex C.

Both the MIS and policy teams began their work by reviewing background documentation and participating in a team planning meeting at the Monitoring, Evaluation and Design Support (MEDS) project office in Washington, D.C. The team planning meeting included visits from knowledgeable informants resident in Washington, D.C. and a conference call to the Population and Health Office staff in Cairo.

Upon arrival, the Population and Health Office staff, and representatives from cooperating agencies implementing relevant USAID-funded projects, briefed the team. The team visited pilot project sites in Alexandria and other project sites in Upper Egypt. Most interviews occurred in Cairo.

The team provided the Population and Health Office a midterm briefing, a final briefing, and conducted a supplementary briefing for the Population and Health Office chief and the Mission project development officer.

II. IMPLEMENTATION ACTIVITIES: OBJECTIVES, PROGRESS, AND CURRENT STATUS

The assessment team was unable to count the number of MISs implemented by USAID-funded projects in the five years, let alone review all of them. This fact illustrates the ease with which contemporary technology can massage and present information, hopefully to support management decisions. With the guidance of health policy officers and other observers, the team focused on systems that represent a major effort on USAID's part (or seem to be the most widely used). The MIS activities reviewed include technical assistance and, in most cases, training, as well as technology procurement and the supply of customized software.

These applications fall into the following four broad categories:

1. **Support for rationalizing services and financing.** A number of systems were developed to support a major policy effort intended to rationalize services and financing. Some of these systems supported the technical analysis and operations needed to establish the pilot models. The systems included in this review are those intended for general use during routine operations: patient-based records and fund management.
2. **The Ministry of Health and Population (MOHP) infrastructure.** A substantial hardware investment has been made to network the MOHP with state-of-the-art equipment; 7 servers provide networked communication and internet access to some 150 computers in ministerial offices. Some financial applications developed earlier with USAID support are shared through this network, as well as an interface to information intended for use in executive decision-making. Training in basic computer skills has also been provided.
3. **Support of technical programs.** These information systems are implemented in the context of broader technical support intended to strengthen specific services. These support packages generally include training in the use of information to improve and expand services. Examples include Population/Family Planning/Reproductive Health IV (POP IV), Healthy Mother/Healthy Child (HMHC), and Controlling Emerging and Endemic Diseases (CEED).
4. **Hospital information infrastructure.** USAID made substantial investments in hospital information infrastructure during the 1990s. One of these projects, the hospital management information system (HMIS) for four Curative Care Organizations (CCO) and MOHP facilities, is still under development. This project is purely a systems development effort and does not include a component for supporting use of the information for management.

All of these information systems were designed to contribute to USAID's overall Agency Goal 4: Reduced Population and Improved Health. In its country plan for 1997–2001, USAID/Egypt addressed this goal with two SOs: SO 4, Reduced Fertility, and SO 5, Sustainable Improvements in the Health of Women and Children. The third category of information systems, which support specific technical programs, addresses results in both SO 4 and SO 5. The other three categories of MISs form part of the Results Package for HPSP. They address Result 5.4: Improved Environment to Plan, Manage and Finance Sustained Maternal and Child Health Systems.

Ongoing projects have been incorporated into SO 20 of the 2000–2009 strategic plan. This document refers to both old and new SOs.

A. RATIONALIZE HEALTH SERVICES AND FINANCING: FAMILY HEALTH FUND (FHF)

Background

Rationalization of health services and financing is a priority for MOHP. A ministerial task force, the Technical Support Office (TSO), has been formed to coordinate activities undertaken by MOHP and its three major cooperating partners: USAID, the European Union, and the World Bank. Three governorates, Alexandria, Menoufiya, and Seuf, have been selected to pilot test the model for restructuring. USAID has been a major collaborator in the initial pilot testing in Alexandria. Training and pilot testing in the other two governorates are scheduled to begin within a few months.

The initial model uses family health centers established at accredited clinics within the MOHP, Health Insurance Organization (HIO), nongovernmental organization (NGO), and private sectors to provide primary care to between 500 and 800 families enrolled to a team of one family practice physician and one family practice nurse. Clinic operations are assessed monthly based on a set of 11 performance criteria that reflect cost-effective and quality practice patterns. Clinics are awarded incentive payments from the Family Health Fund according to their performance; the clinics then distribute the incentives to individuals, both practitioners and support staff, based on internal clinic criteria.

The Alexandria Family Health model is based on the Social Fund's earlier independent experiments with this type of service delivery. Several models were developed during this period of experimentation. Two models have associated automated information systems. One of these systems is supported by the National Information Center for Health and Population (NICH), as described in section II.B., and is reported to be installed in approximately 400 clinics. The team made a brief visit to one of these clinics, the Karnak Clinic, as described in Section III.A. The second model was used in 10 clinics, and the information system is apparently no longer supported. Another system, based on the Social Fund's model, is apparently being developed with Italian support, including information systems support; those interviewed knew little more about this system. Time did not permit the team to inventory and document all the variants on the

Family Health model. The discussions about these various models sometimes seemed ill-informed; it would be useful to collect basic information about these models.

The pilot test in Alexandria expands the Social Fund model to include performance incentives. This model is currently used in four clinics, one each from MOHP, HIO, NGO, and the private sector, and in three units ancillary to the MOHP clinic. The TSO plans to expand the pilot test to 15 additional clinics in the coming 9 to 12 months: 5 clinics in each of the 3 pilot governorates. With the support of the European Union, training centers are being established at clinics in Menoufiya and Sohag, where family health physicians and nurses will receive hands-on training in the new model.

In terms of USAID's Strategic Framework, this activity falls under HPSP, with the objectives as outlined under SO 20. Aspects of its implementation are included as benchmarks for release of the cash transfer tranches.

MIS Activities

Use of performance-based indicators to award incentives and sound management of the fund presume the availability of good information systems to even begin testing the model. This fact was recognized from the outset by all the implementers. Two types of information systems have been developed: patient-based systems (PBS), which record the details of patient encounters that are used to assess performance, and a performance reporting system (PRS), that uses summary data from clinics to calculate the incentives to be awarded. During pilot implementation, two PBSs were developed: the first for Seuf, the MOHP clinic and its ancillary units, and the second for Abu Qir, the HIO clinic.

A number of problems have been reported with these systems. The governorate's Technical Support Team views problems with the information systems as their most serious constraint in moving forward with the pilot testing. Those involved in establishing the training centers in the other two governorates are unable to begin the demonstration sites for training until stable information systems are in place.

Family Health Fund Performance Reporting System (PRS)

This system is intended to accept electronic data from participating clinics and to calculate the incentives to be awarded. The system was developed using Microsoft Access by U.S.-based consultants and installed during a 1-week period in Alexandria.

While the system has been used to calculate incentives, software problems have required that some data be entered manually and that some data be exported for processing in spreadsheets. Besides being labor intensive, these manual procedures may introduce human errors. The U.S.-based system developers have responded to requests for assistance, but it is difficult to communicate and to solve the problems without on-site support. The functionality of the system is also limited so that capacities for overall fund management, financial analysis, and cost accounting are either nonexistent or extremely limited.

Patient-Based System (PBS) at Suef

This system was developed using Microsoft Access by the NICHHP. It is based on a Windows 2000 network with workstations at the registration desk, at each physician's station, and in the laboratory and pharmacy. It records family registration information, details of patient encounters, laboratory orders, and pharmacy scripts.

Problems reported with this system include inaccuracies in reporting, incomplete functionality, and lack of timely support—especially for server problems. (The server has sometimes been down for 25 percent of the time.) While NICHHP has tried to be responsive, even to the extent of posting consultant support in Alexandria, Seuf continues to report difficulties in using the system.

Patient-Based System (PBS) at Abu Qir

Abu Qir is an HIO facility, and its PBS is a version of the standard HIO polyclinic system, which uses the Oracle development platform. It was reengineered from the Unix operating system to Windows by a local consulting firm, under a contract from the Partnerships for Health Reform (PHR) project. Like the Seuf system, it is based on a Windows 2000 network with workstations at similar positions. Similar information is recorded in the PBS with somewhat different coding systems, such as the HIO standard for diseases (ICD–9) instead of the MOHP standard (ICD–10). The TSO and MOHP have decided that the Abu Qir system should form the basis for other pilot test sites.

Problems reported with this system include inaccuracies and slowness in calculation, incomplete functionality, and inadequate server and/or network power. (There was apparently no functional analysis of the expected loads to determine processor and storage requirements.) HIO is willing to assume responsibility for maintenance of the system and has assigned an experienced network administrator to troubleshoot problems. However, there has been some difficulty in obtaining the source code documentation necessary to modify the software.

Summary

The information systems supplied by PHR during the pilot have served to test the model's operation. However, these systems are not robust enough to replicate in other pilot test sites. The main lessons learned from the experience in implementing these information systems are the following:

- MISs should be designed according to specifications based on the Egyptian context, with major input from local experts; and,
- MISs should be developed and maintained by local information technology specialists.

Reengineering the Abu Qir PBS, and redesigning and rebuilding the Family Health Fund PRS, are priorities and should begin as soon as possible to avoid further delays in expanding the pilot tests.

B. INFORMATION INFRASTRUCTURE: MOHP

Background

In 1998, at the direction of the minister of health and population, MOHP reviewed the role and rationale for its information systems. Information systems had been introduced into MOHP operations by projects or at the request of senior officials within the Directorates. This approach led to fragmented systems that sometimes produced inconsistent information, were not conducive to integrated management, and had no ongoing support after project completion or the official's attention was taken by other responsibilities. While the MOHP included an Information and Documentation Center (IDC), it lacked the mandate and expertise to coordinate and support information systems development.

Recognizing that reliable, consistent, and integrated information is always necessary for effective management, and would become even more important in the ministry's priority program, health sector reform, the minister initiated a series of decrees and activities to rectify the inadequacies that had been identified.

Two MOHP decrees announced in 1998 provided NICHIP's mandate. One, number 29, establishes the principle that within MOHP a central information office has the responsibility and authority to integrate and provide support to information systems from national to district levels, and across technical areas at all levels. The second decree, number 336, formally establishes the NICHIP as the central information office, with specific responsibility for setting information standards; this decree also tasks NICHIP with collecting, organizing, and disseminating electronically stored health information, as well as relevant information and publications in print and other media.

In terms of USAID's Strategic Framework, this activity falls under HPSP, with the objectives as outlined under SO 20. Aspects of its implementation are included as benchmarks for release of the cash transfer tranches.

MIS Activities

USAID responded to the minister's initiatives using the mechanisms built into the PHR project, which included a long-term information systems adviser, short-term technical assistance, and information technology procurement.

During the first half of 1998, the NICHIP was established, and an organizational structure with staffing patterns and job descriptions was prepared. Senior technical staff members were assigned using a USAID contract mechanism. At the same time, the MOHP renovated the building that was to house the information technology that would support

NICHP's activities. USAID supported the procurement of state-of-the-art networking facilities, including computers, cabling, and telecommunications technology. This facility was officially opened in December 1998.

During the two remaining years of the PHR project, site preparation, fiber optic cabling, switches, network hubs, and workstation installation expanded to nearby ministry buildings. By the first quarter of 2001, a network that includes internet access and email service encompassed five ministry buildings and some 150 workstations. The NICHP technical support team is contracted through the TSO and the Cabinet Information and Decision Support Center (CIDSC). This team consists of 13 postgraduates qualified in systems administration, systems analysis, programming, and web development. The contractual mechanism allows NICHP to attract professionals whose private sector salary scales normally exceed those in the public sector.

To take advantage of this infusion of technology, 1500 persons were trained in basic computer skills in 1999 and ongoing training continues for another 6500 persons. Beginning in 1999, NICHP assumed ownership of some existing information systems. It also began developing support for new applications, primarily the executive information system (EIS), the PBS for the family health pilot project in Alexandria, and the geographical information system (GIS), being developed in collaboration with the World Bank. These applications are described in the following paragraphs.

Health Information System (HIS)/Management Health Information System (MHIS)

Transfer of responsibility for maintaining the health information system (HIS) from HMHC to NICHP emphasized the new leadership role for information systems assumed by NICHP. In some ways it provides a model for collaboration between projects and the NICHP. HMHC focuses on strengthening the ability of facility and district managers to use information for planning and refining activities, as reflected in the addition of M for management to the system acronym in HMHC documentation, MHIS. NICHP provides the necessary long term institutional home for information technology maintenance and upgrade.

Data included in the HIS generally originate from clinics and outpatient departments. They do not cover all diseases reported. Few hospital data are included, in particular, obstetric care. And data from non-MOHP facilities are not included; specifically, no HIO data are included. Recent utilization statistics suggest that while 80 percent of hospital admissions are in MOHP facilities, they account for fewer than 20 percent of outpatient visits. The limited number of data sources used in the HIS limits its usefulness in reflecting a population with these utilization patterns. The data in the HIS are well documented in PHR trip reports: Cressman and St. John, September–October 1999; Atkinson, September 1998; Cressman, April–May 1999; and Cressman, June 2000.

This example also reveals the constraints in the collaborative mechanism. NICHP has severely limited resources for employing a team of information technology professionals for ongoing technical support. Salaries and expenses for the two senior information

technology professionals who are responsible for the HIS are paid by HMHC; when the project ends, NICHP itself will likely not be able to afford their services. As noted above, other senior information technology professionals are assigned through the TSO and CIDSC and not directly employed by NICHP. NICHP apparently employs only two information technology professionals; both are junior programmers. It appears that NICHP does not have the resources to employ the senior professionals independently.

The status of HIS development illustrates the consequences of NICHP's limited resources to employ its own staff. Everyone who has looked at the system in recent years has noted that the outdated development platform (FoxPro for DOS) severely limits the way data can be used for management and that an upgrade to a more contemporary platform is a priority. CIDSC began an upgrade to the Microsoft Access platform; this activity ceased when a functional review of a prototype of this system, conducted in 1999, concluded that inadequacies in design and implementation were severe enough to preclude further development. It was proposed that NICHP redesign and implement this design; however, the responsibilities of the senior information technology professionals apparently do not allow the necessary level of effort. While it would be possible to perform the upgrade using an earmarked project funding mechanism, this is not a long-term approach. Without adequate resources for staff, NICHP will find itself in the same position with this and other systems.

Financial Systems

In the mid-1990s, the USAID-supported Data for Decision Making (DDM) project developed several financial decision support tools for the Planning Division. These were implemented in QuattroPro spreadsheets and were used by skilled financial planners. To make these tools available to a broader public that might lack the computer expertise to use them, NICHP assumed responsibility for upgrade and maintenance. The budget tracking system (BTS) has been upgraded to Microsoft Access; both BTS and the national health accounts have been linked to the EIS. The status of two other DDM systems, the cost effectiveness analysis system (CEAS) and the national hospital survey, is a bit unclear. Ownership of both has apparently been transferred to the NICHP.

Executive Information System (EIS)

The EIS is intended as a decision support tool for senior executives in MOHP. It brings together data from disparate sources, including the HIS, the BTS, the population directorate, the pilot reform project in Alexandria, and other reporting systems. It was implemented as an Excel spreadsheet by consultants from the Research Triangle Institute, under PHR, and responsibility for maintenance and upgrade has been transferred to NICHP.

Currently, the system reports on 14 indicators: facilities reporting; primary care expenditures; endemic disease distribution; bilharzia incidence; couple years of protection (for family planning); infant mortality rate; average number of antenatal visits; infant vaccination; infectious disease distribution; outpatient visits per doctor per day;

emergency visits; whole blood expended; population per primary care facility; and, outpatient visits per doctor per day in the Family Health Fund pilot. These data can be viewed in tabular, graphic, and mapped formats.

The system has not been formally evaluated. It is not clear how frequently executives use it, and it is not clear how frequently the data are updated. It has been planned to make the EIS available through a web site, so that persons who are not connected to MOHP's network can use the information. Implementation has apparently not begun because of NICHP's limited human resources.

Geographic Information System (GIS)

In collaboration with the World Bank, and in support of the rationalization of health services and finances, USAID has provided support for developing a GIS in the pilot governorates of Alexandria, Menoufiya, and Sohag. Digitization of boundaries, positioning of public sector health facilities, and data links with population figures have been outsourced to Quality Standards, an Egyptian firm, and appear to be well underway. Links with health data are planned to be established by NICHP when the digitization is complete.

Other Systems

NICHP has assumed responsibility for several other information systems. The Cost Recovery for Health Project (CRHP) developed several stand-alone modules to support various aspects of hospital and patient management, and NICHP installs these upon request by hospitals. The module to support day surgeries is apparently the most popular and NICHP has installed it in 10 facilities. NICHP also maintains the information system to support the family health provider model developed by the Social Fund. While some information from this system apparently flows from the clinics to the Social Fund in Cairo, and NICHP estimates that 400 units use the system, it is not clear how comprehensive these data are. This system was observed in Karnak Clinic where it appeared that manual records of patient encounters were kept, but only family registration data, not patient encounter data, were entered into the computer.

Summary

The establishment and equipping of the NICHP represents a major milestone in creating the organizational and technological infrastructure required for the MOHP to collect and disseminate information. However, if one looks closely at the information systems NICHP supports, it appears that much of the systems development work has been done by external consultants, with NICHP later assuming a maintenance role. It is likely that this situation reflects the project-driven nature of much of the information systems activities rather than the capabilities of NICHP staff, who appear to be skilled professionals. It remains to be seen whether NICHP can assemble the financial and human resources necessary to assume an active leadership role in standardizing and coordinating information systems in MOHP.

C. TECHNICAL PROGRAM SUPPORT

The team reviewed management information systems implemented as part of three different packages of broad technical support. These packages included training in monitoring, as well as using information to improve the management of services.

Healthy Mother/Healthy Child (HMHC)

Background

HMHC focuses on improving the utilization and quality of antenatal and obstetric care in Upper Egypt, where maternal and infant (and specifically neonatal) mortality are higher than in other parts of the country. The HMHC management and health information system (MHIS) is intended to provide a tool for ongoing service management for MOHP, especially at the district level. It also monitors the project's achievements.

The MHIS builds on the system established at the national level and in 27 governorates between 1993–1997 by USAID's Child Survival Project. The MHIS uses the reporting formats and software introduced during this earlier project. Therefore, it is compatible with the MOHP national HIS.

In terms of USAID/Egypt's Results Framework, the HMHC project addresses Intermediate Result 5.1: Improve Quality and Increase Utilization of Maternal, Perinatal, and Child Health Services. Task 4 of the contract specifies the information system activities. The current contract extends from 1998 to 2001. An extension beyond its scheduled completion in September 2001 is currently under consideration.

The contract also notes that the MIS work is "inextricably linked" to other activities specified in the contract and is complementary to the POP IV and HPSP's MIS efforts. Hence, the contract encourages coordination and integration of MIS activities among the relevant subcontractors.

MIS Activities

The contract calls for installation of the information system, including automated support, in all 65 districts in 8 of the 9 governorates of Upper Egypt. (The ninth governorate, Giza, will be included in the planned extension of HMHC beyond September 2001.) There is every reason to believe that this will be accomplished by the target date of June 15, 2001.

The MHIS installation process at the district began by identifying a physical space for the computer equipment and personnel who could be trained in data processing and analysis. Designated personnel include two data entry technicians and one information center manager. The physical space was renovated and furnished as required to meet minimum prescribed standards for security, electricity, air conditioning, and telephone connections.

A computer and accessories (printer, modem, uninterruptable power supply, etc.) were then installed. The Development/Training 2 (DT2) project trained staff in basic computer literacy skills, as well as the MHIS customized software platform and use of procedures manuals developed for the information center.

In 1999, responsibility for maintenance and support of the MHIS was transferred to NICHP. By ministerial decree, the NICHP has become the institutional home for MOHP information systems. The MHIS was implemented in the mid-1990s and has yet to be upgraded. The software platform is FoxPro for DOS. It is outdated and has been off the market for some years. This creates technical problems in making the data available for local ad hoc analysis and in correlating the data with other data sets. (These issues were discussed previously in relation to the NICHP, in Section II.B.)

District management teams (DMTs) have been trained to use the information in quality assurance procedures, and in planning and monitoring their activities. DMTs conduct a quarterly review of results reported from the MHIS to identify facilities that need supportive supervision to improve performance. This process institutionalizes the use of information. Guidelines for preparing district annual plans emphasize the use of data to prioritize needs and to establish and monitor measurable goals.

District plans go beyond monitoring HMHC project objectives to assess whether previous achievements, such as improved childhood immunization rates, are sustained, and to integrate family planning objectives related to reproductive health. As HMHC phases out its operation, DMTs are now encouraged to base their annual planning process on goals set by the Healthy Egyptians 2010 program.

Summary

HMHC has used the technology to improve district management practices, to integrate antenatal and obstetric care with other reproductive and child health issues, and to move the MHIS beyond the time-limited interests of the project through collaboration with NICHP.

Population/Family Planning/Reproductive Health IV (POP IV)

Background

POP IV focuses on increasing family planning use and supporting technical and management development in related organizations. POP IV's MIS efforts include systems development to support MOHP's use of family planning information, decentralized to the district level. It also supports MIS efforts in other public sector organizations and NGOs. These efforts build on work in information systems supported through earlier USAID family planning programs.

In terms of USAID/Egypt's Results Framework, POP IV addresses both Intermediate Results under SO 4: "Increased use of family planning services and strengthened

sustainability of family planning services”. The Results Package for this project includes MIS activities in support of service delivery, as well as associated training, financial, logistics, and information, education and communication (IEC) systems. These address aspects of each of the five midlevel Intermediate Results under SO 4: “Enhanced supply, increased demand, increased financial self-sufficiency, strengthened institutional capacity, and improved policy environment”.

MIS Activities

POP IV information systems span a variety of organizations and management areas within those organizations. Each organization will have a local area network (LAN) installed, based on the Windows 2000 operating system. Databases will be built using the Sybase database platform. This selection was made at the recommendation of the MOHP population section after a review of options conducted in collaboration with POP IV.

In POP III, the predecessor to this project, databases were built by external consultants, usually from abroad, and installed and maintained locally. In POP IV, it is intended for databases to be built with local, in-house expertise. Training in basic computer literacy for districts and other organizations will be conducted by DT2.

Although POP IV began in mid-1998, procurement of the hardware and software was delayed. Equipment, which was procured in the U.S., is expected to arrive in May 2001. POP IV reports that receipt of the equipment has been delayed by two factors: (1) the time required for negotiation with MOHP regarding the standards for construction, cabling, and equipment; and, (2) the time required by the U.S.-based procurement subcontractor to complete purchasing arrangements.

Initially, POP IV anticipated having a web site to disseminate information about family planning in Egypt. This application has been transferred to the NICHP for inclusion in its EIS and web site (see section II.B.). The equipment and applications for each organization are described below.

MOHP Systems Development Project (SDP)

The Systems Development Project (SDP) is funded by USAID and provides technical MIS support for the population division within MOHP. It is comprised of a staff of 13, some full-time MOHP employees, and some contracted from the private sector. A LAN with 50 workstations will be supplied for the headquarters in Cairo, and it is planned to distribute 259 computers to districts. Training district staff in the use of the information for management was underway by the second quarter of 2001. Applications for the SDP equipment include modules for client data on acceptors and methods, the Quality Improvement Project, births and deaths, Norplant®, Postpartum Intrauterine Devices, training, IEC, mapping, revenue, and finances.

National Population Council

The National Population Council collects and summarizes data on population and contraceptive distribution by MOHP, and a variety of public and private sector outlets. It also tracks distribution to client outlets from the Egyptian Pharmaceutical Trading Company (EPTC) and other sources. A LAN with 30 workstations will be installed. The MIS applications are supported by several in-house MIS units; there is no centralized MIS unit.

Clinical Services Improvement (CSI)

Clinical Services Improvement (CSI), as its name suggests, provides training and support to improve clinical services related to family planning. A LAN with 33 workstations will be installed. Applications include client-based service records and an accounting/financial management system. CSI has a capable in-house MIS unit that can develop and maintain its applications.

Regional Center for Training (RCT)

The Regional Center for Training (RCT) provides family planning training. Applications include a training database, consultant registry, and fund management. A LAN with 14 workstations will be installed. RCT has limited organizational resources for MIS implementation and maintenance and is completely dependent on USAID technical assistance for its MIS activities.

State Information Service

The State Information Service focuses on IEC activities by disseminating information on family planning through a variety of media, including print, radio, and television. A LAN with 34 personal computers will be installed. It has limited in-house capacity to support its MIS activities.

Egyptian Pharmaceutical Trading Company (EPTC)

The Egyptian Pharmaceutical Trading Company (EPTC) is the major distributor of contraceptive devices in Egypt. Its logistics management information system has had ongoing technical assistance through POP IV and its predecessors.

Summary

POP IV has initiated an ambitious agenda of information systems support for MOHP and other organizations active in family planning. Deployment of the technology has not yet begun, so it is too early to tell how successfully the information will be used by managers. Given the varying levels of information technology expertise in the participating organizations, it is not clear whether all will be able to design, implement, and maintain the applications. Except for a few examples, such as the use of family planning data in the EIS and district management procedures introduced by HMHC, it

has not been possible to integrate family planning information with other health information. This situation inhibits the provision of comprehensive reproductive health care, integrated service management, and sustainable, cost-effective maintenance of the information systems.

Controlling Emerging and Endemic Diseases (CEED) Surveillance

Background

Controlling emerging and endemic diseases (CEED) focuses on infectious disease surveillance, including detection and response. It was initiated in 1996 as USAID's response to a presidential decree emphasizing the global priority of infectious diseases. Current activities began in late 2000 and are supported through an intergovernmental agreement (participating agency services agreement) to the U.S. Naval Medical Research Unit and the Centers for Disease Control and Prevention (CDC). Project activities center on fever hospitals (infectious disease hospitals), and include infrastructure improvements in laboratory facilities and laboratory technical training and support, as well as guidelines for disease reporting.

MIS Activities

CEED plans to institute a communicable disease surveillance and reporting system from fever hospitals throughout the districts. Automated support for this system has not yet begun, nor has procurement of the information technology. Original plans called for installation of a computer in each district, along with a customized software package, perhaps implemented in a version of EpiInfo, a software package produced by the CDC. However, the most stable version of this software runs on an outdated operating system (DOS) and does not exist in Arabic in a public domain version.

The CEED implementers recognize that supply of computers to districts may be redundant given the other information technology investments already made by USAID for districts. They also recognize that integration with existing software offers the best chance for sustainability when external support for the surveillance ends, presumably in September 2003. The implementers wisely view the sustainability issue as a priority and have begun working with NICHP and other USAID technical programs to integrate the surveillance system with existing and proposed MIS activities at the district level.

D. INFORMATION INFRASTRUCTURE : HOSPITALS

Background

Three information systems formed part of the CRHP, a USAID project active in the early and mid-1990s. CRHP's management modules included information systems. These modules and their associated information systems can be installed independently, according to the needs of the facilities. Deployment of these modules continues, with NICHP responsible for installing the information systems. The largest investments were

in two systems that encompass patient records, support services like pharmacy and laboratory, and financial records. Neither of these projects included a component for training in the use of information for management purposes.

One system was deployed in approximately half of the HIO hospitals and polyclinics nationwide, and in HIO national and regional headquarters. In 1998 HIO assumed technical and financial responsibility for ongoing deployment, maintenance, and upgrade. Because this project has ended, it was not formally a part of this review, but a summary of events since 1998 shows how technology use can be institutionalized. HIO's in-house conversion of the USAID-supplied system to allow each terminal to use Windows considerably enhanced the initial investment in information technology; it also illustrates the strength of HIO's information technology support. The HIO polyclinic modules were further developed for use in the family health unit model at Abu Qir, described in section II.A. The World Bank is commencing a major health sector information technology initiative, which includes establishing an NTL at HIO.

Development of the second major system under CRHP, the HMIS for CCO and MOHP facilities, began in mid-1998 and is scheduled for completion in September 2001. This HMIS development effort was included in this review. The original HMIS contract specified modules for installation at three CCO hospitals and CCO headquarters. Another hospital, Nasser Institute, was added shortly after the project began. During the course of implementation, ownership of three of the four hospitals was transferred from CCO to the MOHP. The contract was not revised to reflect this ownership change, and it is not clear what the procedure will be for accepting the final product or who will assume responsibility for ongoing deployment and maintenance. This change has also created problems, discussed below, in providing the functionality specified by the contract, particularly in the financial modules.

In terms of USAID's Strategic Results Framework, the objectives for the HMIS project were stated in terms of the overall CRHP objectives: "To increase the economic sustainability of the health and hospital systems of Egypt". When CRHP ended, the HMIS project was incorporated into the HPSP Results Framework that forms the basis for annual cash transfers to the MOHP. One HMIS product, the admissions, transfers, and discharges module, was included as benchmark 2.1.e for the disbursement of tranche 2.

MIS Activities

HMIS development is an ambitious project, with networks installed in four hospitals and the CCO headquarters. The hardware includes main and backup servers for each site, raid storage arrays, routers, workstations (approximately 50 at each site except Nasser Institute, which has approximately 100), peripherals, and power backups.

Before development began, the CCO selected a group of consultants comprised of medical and information technology specialists active in Egyptian health care to travel to the United States to observe and review options for hospital information systems. The

consultants selected VISTA, a system used in Veterans' Administration hospitals, primarily because the software is in the public domain and would not require further licensing to be deployed at additional facilities.

MAXIMUS was contracted to adapt the software to the Egyptian context and to translate the interface and reports into Arabic. Development of financial modules in accordance with CCO standards was subcontracted to International Computers Limited. Because MOHP and CCO financial procedures differ, the transfer of ownership of three hospitals to the MOHP, described previously, means that the financial management modules for cost accounting, and perhaps general ledger, cannot be used at the MOHP facilities.

Difficulties in procuring the required technology and lack of continuity in contractor leadership (there have been at least four chiefs of party; six, according to some observers), has delayed the development process. The project was scheduled for completion 22 months after having been awarded in June 1998. There have been several no-additional cost extensions. Currently completion is scheduled for September 2001, some 17 months after the completion date originally projected. At the time of this review, all modules are being completely deployed at Nasser Institute and Heliopolis Hospital. Deployment of financial modules, and the gateway between the financial and medical sides, at the other two hospitals is scheduled for completion by mid-August. Even if this schedule is observed, it is not clear that enough time will remain for the modules to prove their stability in a production environment.

During development of the system, there have been problems reaching agreement on the detailed functional requirements and revisions. Software can always be developed further, and often, especially in a systems development of this scale, formal written agreements regarding requirements and modifications and acceptance by the client are used to determine when the contracted product is finished. These practices have not been observed during development of the HMIS.

Nasser Institute, which is the leading public sector tertiary care hospital in the country, and one of the centers of excellence designated by the minister of health and population, serves as the primary test site for the HMIS. It has established a committed and capable team of system administrators, programmers, and support staff. This team and its leader have a systematic and practical approach to testing and deploying the system. However, the team leader at Nasser Institute departs for long-term study abroad before the completion of the HMIS contract, and his successor will surely require some time to assume the same role of leadership in institutionalizing the system. Two of the other hospitals, Heliopolis and El Hilal, have smaller and less experienced information support staff, with leaders who have many competing responsibilities. They are far less comfortable with the development process. The fourth hospital, Dar-El Shefa, is undergoing renovations and may not participate fully during testing. While the hospital director is apparently keen to use the system, it is not clear what constraints may arise, and how they will be solved, when renovations are completed and the system deployed.

Sixty persons from the participating hospitals and the CCO headquarters have been trained to provide support once the project is completed. However, except for Nasser Institute, they have been reassigned by the respective hospital administration to their regular jobs and are not currently supporting the system. Three of these persons have been selected for recruitment to the central HMIS support unit when it is created. While this training encompasses all MIS support roles needed at the facilities and CCO headquarters, there is also need to maintain the core programs. No CCO or MOHP personnel have received this training. However, the maintenance skills do reside in Egypt, since much of the programming was developed by local information technology professionals.

The institutional home for the HMIS has not been determined. After the system is complete, there will be a need for ongoing maintenance. Additional effort will be required to support deployment in other hospitals. The MOHP would be the natural home, since most of the hospitals belong to its facility network, and in principle the MOHP appears willing to take a leadership role. However, no concrete plans appear to have been made regarding formal transfer of responsibilities. No staff has been assigned and no budget has been allocated.

Summary

Even if the system is deployed to the satisfaction of all client hospitals and ongoing maintenance issues are resolved, the question of how effectively the system will be used for management remains. The system will probably be of immediate use in operational aspects of running the hospital such as patient record keeping, management of the laboratory and pharmacy, scheduling of services and staff, billing, and financial record keeping. However, it will likely take much longer for managers to learn to use the information to improve the quality of care, patient outcomes, and cost-effectiveness of service delivery.

III. ISSUES AND CRITERIA

As the MIS assessment team reviewed each of the many MISs in use, the over-riding question was whether the information is used to improve the health of families. Given the predicted termination of USAID health and population sector assistance at the end of this decade, particular attention was given to sustainability, rates of replication, and donor collaboration.

As a result, the MIS assessment generated six cross-cutting issues or criteria. These are common issues when viewed retrospectively during an assessment. Prospectively, they should be used as criteria for determining future USAID support for MIS activities. They lead directly to the recommendations in the following section.

- **Use of Information.** Each MIS is intended for a different purpose. Specific outputs were anticipated during their design. The team looked for evidence of the existence of these outputs—and most importantly—whether these outputs were being utilized to have an impact on the health of target populations. The team was particularly interested in examples of information use that appear to improve health service; these create the foundation for a corporate culture that values information.
- **Sustainability.** When computer systems are used by individuals with little or no knowledge or experience using them, problems are likely to occur. Systems that are useful and used are also living and changing. The software needs to be continuously modified to meet new requirements. To be sustainable, ongoing local technical and financial support must be available after the initial investment in technology. Arrangements for such support must be a part of the investment plan from the beginning.
- **Replicability.** Given sufficient funds and technical assistance, you can make almost anything work in a pilot project. The question is whether it is replicable. Can it be multiplied seven thousand fold? Too often, when asked this question, respondents broke into peals of laughter and guffaws.
- **Compatibility.** Diminishing proliferation and duplication implies the same data should be available to many users. Information from one system should be easily correlated with information from other systems. This means establishing standards for data codes, like diseases, and for software, particularly databases.
- **Cost.** Is the output worth the expense?
- **Coordination.** Systems that are coordinated with the interests of different groups are likely to prove more sustainable and are likely to migrate faster toward compatibility.

A. USE OF INFORMATION

Donors, particularly in Egypt, like to buy lots of computers and computer systems. It is a relatively easy way to expend project funds, and it is an expenditure that is very popular with counterpart recipients. Nevertheless, if the expenditure on information technology fails to improve the health of Egyptian families by improving the quality of care, or at least the efficiency of the health delivery system, the money is misspent.

We found that MISs are most likely to succeed when they are directly linked to the flow of resources that impact those who generate the source information. Systems that are currently being implemented with USAID support, those that have been implemented in the past with USAID support, and those that have been implemented by MOHP independently, have all been used to improve health care. Much depends on the initiative and acumen of the managers and providers.

Use of Information at the Facility Level

- The Family Health Fund pilot projects at Seuf and Abu Qir reportedly reduced tendencies to overprescribe and over-refer. This is a significant achievement that allows limited funds to be put to better use. The PRS MIS, which tracks prescribing and referral patterns, enables this accomplishment. It works because it is tied to an incentive scheme that makes the family physicians the direct beneficiaries of diminished prescribing and referring. This incentive scheme also includes standards for quality of care, primarily measured by preventive care coverage rates.

The implementation of the PBS as part of the Family Health Fund pilot was less successful. Although they are noble visions filled with promise, they do not yet work. In general, the two health centers visited where these systems are installed continue to rely on manual, register-based systems to record reliable service statistics and maintain patient records.

- A little information goes a long way. Staff at facilities where computers were present, and even minimal training had been provided, showed impressive creativity in putting the new technology to use. Compared to the best of information technology ambitions, these applications were often clumsy and unsophisticated. For example, in Abu Qir providers themselves used the manual records to create a Microsoft Excel spreadsheet to analyze their own performance. On-site practitioners identified their own computer needs and used their own knowledge and computer tools to meet these needs.
- An astute facility manager can use fairly simple tools to make noticeable improvements in the quality and efficiency of service. The physical plant at Quos District Hospital in Qena governorate was considerably improved by the HMHC project; it then qualified to participate in a cost recovery scheme

whereby hospitals can begin fee-paying services. The revenues are divided so that 10 percent go to the governorate, 40 percent to hospital staff as incentives, and 50 percent are reinvested in service improvements. Informal estimates suggested that staff salaries were doubled by the incentives. The hospital manager used techniques and a fairly simple information system, both of which had been developed earlier in the USAID-funded CRHP. Once again, the link between the MIS and incentive payments leads to a far greater regard for the MIS.

- The Social Fund introduced a family health service delivery model that served as an example for the later Family Health Fund pilot in Alexandria (see Section II.A.). The Social Fund model was an MOHP initiative undertaken independent of donor support and includes a manual record keeping system based on the family unit, with optional automated support. The Social Fund reports that this orientation to service delivery has improved coverage indicators such as family planning acceptance. The Social Fund's experience with information will be valuable as the Family Health Fund pilots expand to emphasize facility and service management. The one example of this system the team saw in operation, at Karnak Clinic, appeared to be incompletely implemented; however, more innovative management might well have produced a different result.

These observations suggest an alternative approach to large projects that intend to introduce a single system at many facilities. Sometimes, especially at small facilities, it might be enough to clearly communicate the desired results—perhaps accompanied with incentives—then provide computers, training, and support of the efforts of on-site staff to design their own solutions.

The team observed one MIS that intends to provide comprehensive information services for large hospitals, the HMIS. Discussions were also held with MIS staff at branch and national levels of the HIO, where USAID supported the development of a polyclinic, hospital, and institutional MIS during the mid-1990s, and where the NTL will be housed.

- The HMIS being developed for the MOHP and CCO hospitals is almost entirely unused, despite considerable investment. Given the imminent project completion date, poor progress to date, and considerable technical concerns, prospects for its immediate use are poor. The good news is that programming responsibilities now lie entirely in the hands of Egyptian nationals. Enough work has been done to demonstrate its potential. The end of project date provides USAID with an opportunity to turn the task over to the MOHP and CCO and let them decide how to proceed. Much of the dissention is internal to the recipient hospitals and presents an unattractive involvement for any donor.
- The HIO MIS has been used to contain costs in several ways: reducing unnecessary prescriptions and referrals, and detecting fraudulent use of

services. While those interviewed did not have detailed information at hand, there was general agreement that the savings had been considerable. Certainly the system is considered cost-effective enough that HIO invests its own resources in upgrading the system and installing it in additional facilities. Unlike the MOHP/CCO HMIS effort, HIO technical staff were trained in system support as the development effort proceeded.

Use of Information at the District Level

Districts have responsibilities for monitoring and supervising facilities. They represent the natural focal point for strengthening management because they include all the elements of a referral chain. They are also close enough to the facilities and communities to provide direct support in improving health behaviors and health care. At least in HMHC assisted districts, they also plan and budget. The current link between planning and budgeting is limited because the distribution of funds remains very centralized. This is likely to change, assuming the decentralization process proceeds as it has in other countries. The MOHP's overall agenda for health sector reform emphasizes decentralization to the district level. Donors see the plans for decentralization as a call for assistance in strengthening district level management. This should certainly include strengthening district level information systems to serve as the basis for improved planning. The budgeting process should be changed to activity-based budgeting that matches the planning process and supports decentralized decision-making on the use of available funds.

- HMHC has most of the elements in place. District management teams convincingly describe how they use community needs assessments and their MHIS as the “two legs” of their planning process. They involve community advisory groups at the district as well as facility levels. The only shortcoming may be in the format of the budgeting process. Activity-based budgeting would further strengthen the capacity of the planning infrastructure to put the MHIS to good use. Also, the MHIS automated system does not include data from hospitals. Addition of this data is essential to manage the service delivery system effectively.

The HMHC approach emphasizes measurable improvements in performance at both the facility and district levels. HMHC emphasizes those indicators most directly reflecting the health of the target population and sets up a management structure at the facility and community level to review and respond to these indicators. The source data come from unwieldy data collection tools, but the tools are familiar to providers and encourage them to focus on relevant health-related results without unnecessary information technology distractions. The management and planning functions encourage interventions tailored by the local community and lay the foundation for the kinds of decentralization intended under the MOHP's health sector reform agenda.

Under decentralization, the increased responsibility of the district management team suggests this group should have periodic access to the service statistics from non-MOHP facilities.

- The team visits to Seuf and Abu Qir did not include meetings with the Montazah district management team. Because this remains very much a pilot project, the key relationships seemed to be between the two facilities, the Family Health Fund, and the Technical Support Team at the governorate level. There has apparently been little attention to the anticipated district use of information yet.

Use of Information at the Governorate Level

The governorates appear to function as tentacles of the centralized health administration system. Although health sector decentralization will proceed first to governorates, then to districts, the governorates are too far removed from the service delivery sites to achieve the benefits anticipated from decentralization. The pilot governorates do have Technical Support Teams, which work in collaboration with the national TSO. These teams will likely prove instrumental in implementing the reform process. This process of change should include information systems.

HIO's corporate structure includes nine branch offices. Each branch covers several governorates. Five of the branches have an information technology support staff for their own operations, and the information technology support staff will soon be added in the remaining branches as facilities there are automated. The HIO branch offices also use the MIS to improve efficiency, using the same techniques as described above for their facilities. This technical support staff is being used in Alexandria to provide support for the Family Health Fund pilot in Abu Qir polyclinic, which is an HIO facility. Given the variability of information technology support within health sector offices at the governorate, the HIO offers an attractive alternative for support.

Use of Information at the National Level

At the national level, the team interviewed representatives of the MOHP, primarily TSO, NICHHP, and Planning, and with HIO; time did not permit interviews with MOHP technical departments such as family planning and maternal and child health. The breadth and range of MISs that forward data to the national level means that many conclusions remain incomplete. The following was observed:

- Processing of HIS data at NICHHP emphasizes completeness of reporting. This is no small task; but it is achieved—with some delays. This allows the publication of annual statistical reports that provide an overview of MOHP health services. (Completeness of HIS data means expected reports. However, these reports deal only with MOHP facilities. They do not cover all of the services provided by all MOHP facilities. For example, few hospital data are included.)

Response to the implications of these statistics is left to the technical units that—in many cases—provide the required data. Delays in accumulating complete reporting means the data are too dated to serve a useful feedback function. This current use is primarily one of aggregation and reporting. Options for better management use of HIS data are proposed in other sections of this report.

- The Department of Planning offered numerous examples of how information is used for planning and decision-making. The team's brief visit to the department was interrupted repeatedly by parliamentarians inquiring about hospital construction in their districts. The director of planning described how he uses the BTS and financial data from governorates to respond to parliament and to plan expenditures. He went on to predict even greater use of this information during implementation of health sector reform, particularly decentralization.
- The EIS is intended to provide information for decision-making by senior officials, but we were unable, during limited inquiries, to find examples of how it was put to use. With some further modification, this system might better respond to needs by going beyond pre-packaged reports and allowing ad hoc inquiries.
- GIS activities, funded in collaboration with the World Bank, produce good visual presentations, but the team—admittedly during a short visit—was unable to link this system to evidence of improved services or increased efficiency. The system has yet to be completed and perhaps it is too early to assess its eventual impact.
- The HIO information appears to be used very well to control costs. Evidence from the visit to the Alexandria branch office supports this conclusion. Government intention to use this system as the basis for health sector reform suggests the government has come to a similar conclusion. Potential cost savings makes this a priority area for donor investment.
- Time constraints prevented the team from visiting technical units—such as family planning and maternal and child health—at the central level. Nevertheless, our experience from other countries leads us to believe that service statistics have the greatest impact on coverage and quality when used closest to where the services are provided. We expect that as health sector reform and decentralization proceed, aggregate information reaching central level technical units will be used primarily for broad policy and regulatory functions.

B. SUSTAINABILITY

When hardware and software are in the hands of people unaccustomed to computers, equipment and systems often fail. Even if software were perfect, as technology advances, new requirements emerge that require new functionality. Hardware inevitably breaks, and even if precautions are taken to protect the equipment, the mean time to failure can be expected to be low in an environment with extreme temperatures and dust.

Sustainability should be a prime concern for a donor such as USAID that anticipates an end to sector assistance within the decade. Sustainability, and particularly an exit strategy for donor assistance, should be a part of any further USAID investment in information technology.

Factors that predict sustainability include

- use of information,
- ownership,
- provision of training,
- technical support, and
- recurrent replacement costs.

Use of Information

If the information being collected and reported is not used for any purpose obvious to those collecting and reporting it, the system will soon fall into a state of disrepair, and may disappear entirely. The EIS is an example of a system that may face sustainability issues unless greater use of information occurs.

Ownership

When users perceive the information system as the exclusive result of donor interventions, the system is likely to be short-lived.

Provision of Training

Health systems typically experience a great deal of turnover. Quality training must be available for new users; otherwise the system will quickly deteriorate.

Technical Support

Information systems always develop unforeseeable problems. The management systems they serve are in a constant state of flux. Technical support is needed to resolve these problems and develop new applications. Especially under a decentralized system, this technical support must be close at hand—sufficiently close to ensure uninterrupted use of the information system. For many of the current systems, manual systems are maintained

in the background to ensure continuity of data collection. This diminishes the utility of the newly introduced systems.

The HMIS for the MOHP/CCO hospitals is one example of incomplete arrangements for ongoing technical support. While facility support staff was trained, they have not always been assigned those tasks. There are no in-house staff members with the training to completely maintain the system.

Three groups are major providers of ongoing technical support for nationwide systems: NICHIP, SDP, and HIO. USAID has provided significant financial support to each of these groups in the past five years. The recently formed NICHIP has the mandate to establish standards for data encoding and technology and to guide and support information systems within the MOHP; it houses and supports an impressive networked technology that serves MOHP in Cairo. For some years SDP has provided support for a variety of MISs used within the MOHP's population directorate. Time did not permit an interview with SDP staff. However, by all reports the quality of SDP's support is excellent. HIO's in-house technical staff supports a complex system that networks its central and branch offices and facilities. With high-level technical staff at its branches, HIO has a support base at the governorate level that can reach to its facilities fairly directly.

Each of these groups has unique strengths and mandates. Over the coming years, as the use of information technology increases, these groups will need to coordinate closely to integrate data and technical implementation, especially in areas of overlap, and to provide cost-effective support. The recommendations at the end of this report include suggestions as to how USAID could stimulate this coordination.

Recurrent Replacement Costs

Simply keeping the systems running incurs costs. Greater amounts of required equipment, and the related rise in technical sophistication, leads to increased costs. Typically, institutional annual budgets include 10–15 percent of the original equipment price for recurrent replacement costs. (This is separate from annual depreciation of capital expenditures.) The team observed examples of equipment that could no longer be used because of cost constraints: the budget at Seuf did not permit paying monthly phone charges for information transfer, and an uninterruptable power supply and Zip drive at Quos were broken. When technology is supplied, the receiving institution must be able to absorb recurrent costs.

C. REPLICABILITY

USAID, as well as other donors, has responded to the challenges of health sector reform by initiating a number of MIS pilot projects. Although these projects invariably demonstrate noble ideas, the challenge is their replication in a health system the size of that in Egypt. A pilot in a few facilities must be replicated thousands of times. A pilot in

a district must be replicated hundreds of times. It is difficult to assure the system will be operational when replicated. It is even more difficult to assure the quality of the system.

Specific problems likely to occur include:

- **Staffing.** Pilots are typically undertaken in sites where quality staff increases the chances of success for the pilot. Alternatively, good staff are transferred to the pilot site to increase the likelihood of success. Neither is possible during nationwide rollouts.
- **Procurement.** Procurement procedures that are problematic during a pilot can become prohibitive during national rollout.
- **Training.** For a pilot, training can be done on-site. For a rollout, a nationwide training methodology is required. This can be very expensive. Staff turnover usually requires a permanent training mechanism.

Nevertheless, MIS pilot projects often demonstrate successful aspects that can be easily replicated, particularly when these aspects owe their success to basic human nature (e.g., incentive payments) and when they provide a mechanism for communicating agreed-upon national reforms (e.g., PRSs). Even in the absence of donor support, incentive payments, PRSs, and BTSs can be expanded and maintained by existing institutions—even though that expansion may rely on less sophisticated information technology.

At the other end of the replication spectrum, the POP IV MIS is already nationwide and requires no replication—integration perhaps. Similarly, the HMHC approach to MIS will soon include 25 percent of all districts including those districts in Upper Egypt that are arguably worthy of priority attention. HMHC's rate of replication is increasing. HIS activities undertaken by HMHC could soon cover most of Egypt. The MIS for CEED will soon reach its intended magnitude. Integration rather than replication will be relevant issue.

D. COMPATIBILITY

Compatibility is not unrelated to key sustainability issues. The use of a variety of software applications multiplies the need for technical support. If systems are to be rolled out nationwide the requirement for technical support—when multiplied by the number of software packages in use—becomes quite enormous. Compatibility and standardization dramatically increase the likelihood of sustainability while reducing the cost.

The cabinet has already decided on standardization on Oracle database software for national information exchange. However, the costs for the database package itself and for the level of technical skill required for programming, make this infeasible for every local level use. The recommendations at the end of this report propose options for

database standardization that aim at providing the necessary power and compatibility while minimizing expenses and opportunity costs.

E. COST

Donor-funded pilot projects have the luxury of incurring costs acceptable to donors who are often eager to spend. This is an unlikely condition for the national government of a developing country. All donor-funded information systems activities—at least those with ambitions for sustainability—will have to trim both the costs of nationwide rollouts, as well as recurrent costs, to a level acceptable to the Government of Egypt.

Obviously, the most attractive investments are in systems that appear to generate institutional cost savings such as the ones used at HIO. Informants provided informal estimates of the costs for replicating the pilot Family Health Clinics at Alexandria at LE 500,000 Egyptian pounds (LE) for refurbishing and furnishing the physical plant (reconstruction doubles this estimate), and an additional LE 300,000 for the information technology and site preparation for the information system. The Family Health Fund model focuses on staff incentives, and it is not clear, at least to the MIS assessment team, from where the initial capital outlays for clinic information systems will come.

As a donor, USAID has considerably more latitude than the Government of Egypt in making information technology investments. It has substantial capital at its disposal and it can take more risks in investing that capital in its portfolio. Nonetheless, there are tradeoffs in investments, and it is useful to estimate the overall investments made in information technology and consider whether the payoff has been worth it.

The following table was prepared using figures provided by USAID/Egypt/PH. The objective was to come up with a rough overall estimate of information technology investments, not to compare projects. This overall estimate is probably within 10 percent of the actual investment. (Figures for projects are not comparable. Some project estimates include all technical assistance; some partial technical assistance; and some no technical assistance. No figures were available for PHR, which is a global contract, so an estimate was made based on presumed equipment and long-term advisor costs.)

Table 1: Estimate of Information Technology Investments

	(millions)
HIO	\$ 23.0
HMIS	\$ 4.9
POP IV	\$ 2.0
HMHC	\$ 0.8
PHR	\$ 5.0
Total	\$ 35.7

It is the view of the MIS assessment team that this investment has yet to justify itself. It is also the view of the team that the investment can justify itself in the long run by focusing on using the information to improve care and reduce costs.

F. COORDINATION

Information systems should not exist in isolation. The greatest benefits arise from the synergistic use of multiple systems. There are clear advantages to using information from family planning systems in conjunction with maternal and child health systems at the provider level to maximize the service provided at each contact. Similarly, there are clear advantages to correlating the information from these systems, as well as financial information, to manage overall service delivery.

Coordination is a particularly important concept in nationwide rollout. The information culture and required basic computer skills are common to all of these MISs. The most efficient rollout of any single system may be achieved by adding the new MIS as a component to an MIS that is already in place.

Institutional coordination is also essential. USAID has already begun information technology coordination between its health and population sections, and between its contractors through regular meetings. At the very least, this coordination should prevent duplication and different software standards; at best, it will allow everyone to take advantage of opportunities to exploit synergies.

Coordination between donors and MOHP is also essential and there are examples that suggest this process is underway. MOHP, through the TSO, provides leadership in the reform process; donors hold regular meetings and even collaborate on activities like the GIS work. As USAID plans its investments over the next decade it will need to coordinate with other donors. The recommendations in the following sections point to potential areas of overlap where these can be foreseen.

IV. RECOMMENDATIONS

The review team's scope of work asked it to focus on bridging activities for the transition into the next 10 year programming cycle, when USAID/Egypt will phase out assistance in the health and population sector. In addition, several projects with major information systems investments have recently completed or are near completion. Therefore, these recommendations are organized into three roughly sequential time periods: immediate, medium term (next 12–18 months), and long term.

A. IMMEDIATE NEEDS

These recommendations address pressing issues that need to be resolved in the immediate future, either to complete activities already begun or to move current activities forward. Some are stopgap measures and anticipate further action later, according to other recommendations. These dependencies are noted where they exist. It should be possible to implement all of these recommendations using local technical assistance.

Recommendation 1: Complete Health Policy Pilot Systems

- a. Contract with local firm to reengineer the PBS, based on the Abu Qir model, under supervision of TSO.
- b. Contract with local firm to redesign and implement the PRS for the Family Health Fund, under supervision of TSO.

The Abu Qir PBS has been selected by TSO to be used in other policy reform sites. Both the PBS and PRS contain programming errors and functional inadequacies that make them unsuitable for replication in their current forms. These information systems are essential to operate the model. It is also essential that these systems be developed and maintained locally. It is in USAID's institutional interests to complete these information systems, to avoid embarrassment and to maintain a leadership role in health policy. One informant estimated informally that reengineering of the PBS would cost approximately LE 400,000 and that redesign and implementation of the PRS would cost approximately LE 600,000. Under the leadership of TSO, the European Commission Technical Assistance Team and HIO have already created a terms of reference for this activity. HIO has indicated willingness to assume ongoing support.

This recommendation is a stopgap measure until recommendation 7 can be implemented. Recommendation 7 would expand the PBS to include facility management support.

- c. Support procurement of information technology for pilot sites in Alexandria, Menoufiya and Sohag, in collaboration with TSO and other donors.

Information technology, specifically a LAN, is required to operate the PBS. The source of funds to procure this technology and make appropriate site preparation is unclear for pilot sites to be activated in the coming year. USAID should collaborate with health policy partners to ensure that funds are available.

Recommendation 2: Complete HMIS Contract

- a. Complete contracted activities as scheduled.
- b. If MOHP assigns budget and staff to assume ongoing maintenance responsibilities, match this commitment with short-term technical assistance contracts with Egyptian companies who implemented HMIS to train MOHP maintenance staff.

All contracted modules are scheduled for implementation at all sites by mid-August. MOHP/CCO have neither the budget nor the staff in place to assume maintenance of the system after completion of the contract, although MOHP appears willing, in principle, to assume this responsibility. When MOHP staff members are assigned, they can be trained in system maintenance by the local information technology specialists who implemented the HMIS.

Recommendation 3: Coordinate and Consolidate Information System Activities Funded through USAID

Currently planned activities by POP IV, HMHC, and CEED call for installation of information systems at the district level. This investment is an opportunity to provide districts with substantial management support, including strengthening of information skills. This recommendation aims at coordinating these activities to provide maximum benefit to district officers while minimizing support costs.

- a. Do not permit contractors to install duplicate or incompatible equipment at national, governorate, district, or facility levels.

At least three current USAID contracts call for installation of computers at the district level: HMHC, POP IV, and CEED. In many districts, there is no apparent reason for this duplication since it is believed all applications could run on one computer. Installing duplicate equipment, with software applications that are incompatible, is both a waste of money and a disservice to the districts. USAID should work to promote integrated management, not continued verticalization.

In districts where more than one computer is needed, the machines should be able to communicate with each other, ideally through a network, and software applications should be compatible (see b below).

- b. Establish software development guidelines in collaboration with partners in USAID-funded activities like NICHP, SDP, and HIO. Insist that USAID contractors observe them.

Currently, two USAID–supported activities are beginning software development destined for district use (POP IV and CEED). Recommendations in this report, as well as discussions with USAID and its partners, suggest that other software development may begin soon. It is essential that the underlying database platforms follow clear guidelines in order to

- encourage data correlation,
- reduce maintenance and support costs, and
- reduce software platform costs.

The guidelines should be developed in consultation with the likely players in forthcoming USAID–funded software work: NICH, SDP, and HIO (as partner in policy pilots; see c below). The MIS assessment team recommends considering the following issues:

The Cabinet has decided that all databases should share a common platform, Oracle. This is an excellent decision because it establishes a standard to promote data sharing and because a mature and powerful database engine is selected. There is no question that databases that contain information to be shared between ministries should conform to this standard. There are two problems with using Oracle at facilities and districts in particular: software development using this database requires a very high (and expensive) level of skill and an Oracle license is required for every machine on which the database is deployed.

Microsoft Access is often the database of choice for developing relatively small applications and appears to be used throughout MOHP for this purpose. There are three main reasons for this selection:

- It is very easy to build applications using Access (and its standard programming language, Visual Basic).
- Access databases can easily be transferred to other Microsoft Office applications, like Word and Excel.
- Access applications can be distributed in “runtime” versions, which do not require that Microsoft Access be installed on the target machine—therefore, there is no need for a site license.

The major problem with Access is that the size of databases it can handle is limited. (This limitation is a practical one; the software simply becomes too slow to use after a certain size. The size limit depends on the number of records and amount and type of information; it also depends on whether the database is networked.)

When Access databases become too large and slow, one option is to move the data to Microsoft’s structured query language (SQL), which is a more powerful

database engine. The advantage of SQL in this context is that usually the same Visual Basic programs can be used as with Access, so there is no need to incur the expense of reprogramming. The data can also be easily transferred to other Microsoft applications. Only the backend database engine changes. In contrast, migrating to Oracle generally requires that the programs be rewritten in a different programming language.

In other words, the combination of Visual Basic, Access, and SQL offers a seamless migration from small to large databases. Basic programming and database skills can produce a useful application that can then be expanded fairly easily. The main disadvantage of SQL is that it requires a site license for every machine on which it is deployed. And in Egypt, it is not the Cabinet's choice for a database standard. (Every database specialist has a favorite engine. Some would argue that SQL is superior to Oracle and some the reverse. There is no question that both are powerful and enjoy broad support.)

It is possible to transfer data from Access or SQL into Oracle and vice versa. However, it is not usually possible to use programs developed in Visual Basic with an Oracle database directly, nor is it usually possible to use programs developed for Oracle directly with Access or SQL. The migration path between Oracle and less powerful, but easier to use, databases is not as clean as the path between Access and SQL.

USAID and its partners should consider the following guidelines for software development until more complete standards are put in place:

- Databases that will be shared with other ministries should be in Oracle.
- Databases that require a powerful database engine at each and every installation should be in Oracle, as per cabinet standard.
- Databases that will be used by MOHP alone should be in Access, if the application is small enough. Applications that may be used at sites with databases ranging from small to large (e.g., the HIS at district, governorate, and national levels) should be written in Visual Basic with migration from Access to SQL. If it is desired to share data from these databases with other ministries, the data can be transferred into an Oracle database.

This recommendation is a stopgap measure designed to prevent further investment in training and procurement for incompatible software platforms until recommendation 4 can be implemented. Recommendation 4 would establish formal MOHP information encoding and software platform standards.

- c. Consolidate information technology support provided by partners in USAID-funded activities such as NICHP, SDP, and HIO.

Ensuring ongoing technical support for information technology applications is essential for sustainability as USAID phases out sector support. USAID's role should be one of facilitating collaboration among the partners and encouraging consolidation of support into a single technical group where feasible. Information technology specialists command high salaries, and having a single technical support group within MOHP is more cost-effective than having multiple groups.

This collaboration and consolidation should happen at two levels: the executive and the technical. At the executive level, strategies to fund information technology support, particularly salaries for information technology specialists, should be shared. Moreover, opportunities should be explored to share these human resources at all levels, and particularly in providing decentralized support at governorate, district, and facility levels.

At the technical level, specialists should meet regularly to discuss and resolve issues of mutual concern, particularly issues regarding the interfaces between different systems.

B. MEDIUM-TERM ACTIVITIES

These recommendations address MIS issues that will affect program activities during the next 12–18 months, as USAID begins its phase out process.

Recommendation 4: Establish Information Standards for Codes, Software, and Data Exchange Before Developing Additional Information Systems

- a. Determine standard codes for disease, pharmaceuticals, medical supplies, etc., through collaboration between NICHP, SDP, HIO, and current U.S. Health and Human Services activities.

There are no standards for codes used to represent basic data elements in health information. Different MISs essentially establish their own codes. Even within a single MIS, codes may differ. For example, in the HMIS, each site begins with a standard set of codes for drugs, but as new items are added to the pharmacopoeia, each site will use a different code.

Lack of code standardization means that data from different systems cannot be readily compared. This creates problems when analyzing cost effectiveness and adherence to standards and protocols.

- b. Assist NICHP, SDP, and HIO to collaborate in establishing standards for software development and data transfer.

Issues relating to standardization of software and data transfer issues are described in Recommendation 3. That recommendation is intended as a stopgap measure until a complete specification can be prepared and the necessary approvals obtained.

Recommendation 5: Reengineer HIS and Rollout to Remaining Districts

- a. Use existing data collection instruments.
- b. Use local expertise for software implementation and ensure mechanism for ongoing support by NICHP.
- c. Include hospital data, HIO data, and health policy pilot data. Modify the automated versions of these information systems as needed.

This recommendation outlines the data sources and information technology upgrades necessary to support strengthening of decentralized management, particularly at district level. It may not be possible to include data from all the sources mentioned in item c in the first version of the system. However, the initial system design should anticipate inclusion of these data. It provides the technical substratum on which to implement recommendation 6.

C. LONG-TERM ACTIVITIES

These recommendations suggest the major MIS issues that will affect programs implemented during USAID's phase out process.

Recommendation 6: Strengthen District Use of Information for Management

- a. Focus on use of information, not new systems.
- b. Involve district management teams in new models for financing as early as possible.

This recommendation outlines the major MIS considerations for long term strengthening of decentralized management. It presumes an information technology foundation that incorporates recommendation 5.

Recommendation 7: Support Ongoing Development of Information Systems for New Financing Model, Leading to Purchaser-Provider Separation

- a. Use local expertise for systems development and maintenance.
- b. Include modules for facility management and for monitoring and evaluating model itself.

The specifics of the new financing models, and particularly of the purchaser-provider model, depend on the results of current pilot testing and on the anticipated health insurance legislation. Information systems will certainly be required to support these models, but it is not possible to foresee the requirements, beyond the stabilization of the Alexandria pilots discussed previously. This recommendation simply suggests overall

guidelines that reflect the lessons learned from USAID's experience in MIS over the past 5–10 years.

Recommendation 8: Major Investments in Information Technology

- a. Do not invest in data warehousing.
- b. Invest in information technology for HIO facilities, in collaboration with other donors, especially the World Bank.

In its scope of work, the assessment team was specifically asked to consider the prospects for supporting data warehousing. Data warehousing refers to the process of collecting, scanning into electronic media, indexing, and disseminating documents produced by an organization. Generally, earlier documents are included to provide retrospective information. This is an expensive and labor intensive task that is often, outsourced even by technically sophisticated corporations in Europe and North America. In the context of MOHP, where many documents are still produced by typewriter, it is unlikely that this effort would be sustained. The corporate culture may change rapidly over the next five years or so, and data warehousing may become a more feasible and attractive opportunity.

If USAID desires to make a major investment in information technology, comparable to the costs for data warehousing, it should consider supporting HIO's planned extension of automation to its remaining polyclinics and hospitals. HIO has shown its ability to use previous USAID assistance to good advantage in reducing costs. Such an investment would need close collaboration with the World Bank, which also plans a major investment in HIO information systems.

Recommendation 9: Benchmarks for Information Systems Should Reflect Overall Performance Expected, Not Existence of Specific Modules

Funds are expended, benchmarks are met, and that is the end of it. Information systems are not a procurement item; they are a dynamic service. The Ministry of Health and Population, the HIO, other in-country stakeholders, as well as the donors, need to know how well these systems have worked. The same groups need to know how well these systems adjust over time to changing information requirements.

ANNEXES

A: Persons Contacted	41
B: References	45
C: Scope of Work	51
D: Recommendation Matrix	59

ANNEX A
PERSONS CONTACTED

USAID/Cairo:

Chris McDermott, Chief, Office of Health and Population
Cheryl Robinson, Health Policy Advisor
Milly Howard, Health and Population Advisor
Sameh El Gayar, Health Policy Advisor
Mark White, Project Officer (CEED)
Nahed Matta, Senior Maternal and Child Health Advisor (HMHC)
Ayman Abdel Mohsen, Project Officer (POP IV)
Alia El-Mohandes, FP/Reproductive Health Advisor
Gary Vaughan, Project Development Officer, Office of Strategy Coordination and Support
Mellen Tanamly, consultant, Health, Population, and Nutrition Office

Ministry of Health and Population (MOHP)

Dr. Ibrahim Saleh, Undersecretary of Planning and Finance

Technical Support Office (TSO)

Dr. Bassiouni Z. Salem, Executive Director, Health Sector Reform Project
Dr. Magdy Bakr, Medical Record and Information Officer

National Information Center for Health and Population (NICHP)

Dr. M. Tayseer El-Sawy, Director General
Dr. Sohier Saad Botrous, Head of Health Information Services
Hossam E. M. El-Ashmuny, Specialist System Analyst, Assistant Director Health Directorate Support Unit
Amir Kamal Mahmoud, Senior Analyst Programmer (Contract)

European Commission Technical Assistance Team (ECTAT)

Ian Pett, CoP
Dr. Rafeek Hosny, Senior Health Policy Advisor
Caroline Knepper, Financial / Budgeting Expert
Dr. Bernhard Eder, Public Health Expert
Dr. Hassan Salah

Partnerships for Health Reform

Dr. Nancy Pielemeier, Project Director
Dr. Mary Paterson, Senior Research Associate, former CoP, Egypt

Healthy Mother/Healthy Child (HMHC)

Dr. Reginald Gipson, CoP
Dr. Ali Abdel Megeid, Deputy CoP for Technical Services
Eng. Khaled Abdel Fattah, Senior Systems Analyst
Dr. Ahmed H. A. Reheim, Health Management and Quality Assurance Specialist
Rebecca Copeland, Monitoring and Evaluation Coordinator

Population/Family Planning/Reproductive Health IV (POP IV)

Luigi Jaramillo, MIS and Contraceptives Logistics Advisor

Ibrahim Ahmed Zaki, Information Technology Expert

Laila M. Kamel, Quality Services Advisor

Controlling Endemic and Emerging Diseases (CEED)

Dr. Cole J. Church, Head Research Sciences Department

Dr. Moustafa M. Mansour, Associate Director of Research Sciences

Dr. Hameed

Hospital Management Information System (HMIS)

Peter Ottis, CoP

Tawfik Yousry, Systems Integrator/Administrator (MAXIMUS)

Madiha Hassan, ICL Coordinator

Curative Care Organization (CCO) Consultant Board

Dr. Ibrahim Fouad, CCO Medical Consultant

Eng. Selim Hafez, CCO Information Specialist Consultant

Eng. Tarek

Nasser Institute

Dr. Nabin El Said, Deputy Director

Dr. Wael El Ganaini, MIS Director for Hospital and MOHP HMIS Liaison

Dr. Emad El Hadidy

Heliopolis Hospital

Dr. Faiza El Masry, General Manager

El Hilal Hospital

Dr. Mahmoud Borhan, Deputy Director of Hospital and MIS Director

Alexandria:

Technical Support Team

Dr. Mahdiya Aly, Director

Dr. Nagwa El Bestairy, MIS

Dr. Hanaa Abdou Mansour, Training and Quality

Dr. Sonia Hanna, Pharmacist

Family Health Fund

Dr. Sami Shehab, Director

Dr. Eman Ezzat Ghaly, Director of Insurance Operations

Dr. Hala Ahmed Masseh, Director of Strategy and Policy

Dr. Hisham Bedeir, Director of Monitoring and Evaluation Department

Dr. Mayssa Ahmetd Abdel-Ghoni, Training Coordinator and MIS for HIO

HIO Branch

Dr. Hazem Helmy, Alexandria Branch Director

Dr. Hoda El Bakry, MIS Chief

Marman Hefnamy, Network Administrator

Seuf

Dr. Hanem El Abbassy, Clinic Director

Abu Qir

Dr. Ali Ali Abou El Nasr, Clinic Director

Dr. Hanan

Dr. Said

Nabel El Margamy, Business Manager

Ebsayed Ahemd Makhtar, Computer Operator

Ehlan Mohamed Aly, Computer Operator

HIO, Cairo

Dr. Mustafa Abdel Ati, Director

Dr. Salwa Al-Seewi, MIS Director

Qus District

District Management Team

Dr. Youssi Mabrouk, Director of Qus District

Dr. Mostafa Osman, Assistant Manager of Qus District

Dr. Mohamed El Karyouni, Neonatologist

Dr. Mostafa Abdel Salam, Manager of Ayiasha Rural Unit

Dr. Khalid El Dossouky, Manager of Nag El Selanai Rural Unit

Fatma M. Ali, Nurse Supervisor

Ragaa Aziz, Nurse Supervisor

Said El Tahor, Administrator

Abdal Fataha Hussein, Health Educator

Ayous Mahad, MIS Specialist

Qus Hospital

Dr. Khaled M. Rashad, Manager

Dr. Kamal Younis, Head of Ob/Gyn Department

Dr. Mohamed Ibrahim, Neonatologist/Paediatrician

Abdel Hakam Hassan, MIS Specialist

Shakat Bakry, MIS Specialist

Luxor Governorate

Dr. Ehab Rezk, Director of Hospital Administration

Dr. Soad Israel, Manager of Training Sector

Dr. Nahed Abdemonem, Maternal and Child Health

Dr. Ezz El Din Abd El Wahab, M. Biyoba District Manager

Nafisa Ahmed Abo El Fadl, MIS Manager

ANNEX B
REFERENCES

Arriaza, E. and Murphy, M. *Implementing a Performance Reporting System for the Family Health Fund in Egypt*. Abt Associates. June 2000.

Atkinson, Brad. *Data Analysis Support for the National Information Center for Health and Population (NICHP) Egypt*. PHR Trip Report. September 5–30, 1998.

Barents Group. *Reforming the Insurance Markets in Egypt, Task D: Regulatory Reform and Supervision of Private Health Insurance and Managed Health Care; Country Needs Assessment and Comparative Analysis of International Regulatory Systems*. November 2000.

Beni Suef District. *District Health Plan*. Healthy Mother, Healthy Child. June 2001.

Caddock. *A Study of the Financial Systems of the Family Health Fund, Egypt*. PHR Trip Report. Abt Associates. November 2000.

Cressman, Gordon. *Budget Tracking System, National Health Accounts, Research Triangle Institute*. June 2000

Cressman, Gordon. *Health Information System Development Plan for Egypt: Phase 1—HIS 2000*. PHR Technical Report No. 40. June 1999.

Cressman, Gordon and St. John, Mary. *Health Information Systems Planning*. PHR. Abt Associates. September 24–October 13, 1999.

Cressman, Gordon. *Health Information Systems Planning*. PHR Trip Report. April 19–May 7, 1999.

Cressman, Gordon. *Building Health Management Information Systems in Egypt, The Role of Technical Support in USAID Program Assistance*. PHR. Abt Associates. May 1997.

Crone and Koch International. *Guidelines for District Health Planning*. MOHP. October 1999.

Edmond, P., Sadiq, S., and Scribner, T. *Establishing a family Health Fund in Alexandria Egypt: The Quality Contracting Component of the Family Health Care Pilot Project*. Technical Report No 42. Abt Associates. December 1999.

Edwards, Hannoura. *Assessment of the National Information Center for Health and Population, Trip Report*. Measure Evaluation Project. April 2000.

Farag, S. *Abo Kir Patient Based System*. PHR. June 2000.

Forte, M. *Medical Records Systems Assessment of Family Health Facilities in Egypt*. Technical Report No 51. Abt Associates. May 2000.

Gaumer, G., Atkinson, B., and Lal B. *Assessment and Development of the Egyptian Ministry of Health and Population Information Systems*. PHR Trip Report. May 15—June 5, 1998.

Graham, L. *Quarterly Progress Report, Cairo Curative Organization Health Management Information System*. MAXIMUS, (CCO HMIS). July 2000

Health Policy Support Program Verification Plan for Tranche Four Benchmarks.

HIS Working Group. (Gipson, Gainsworth, Jaramillo, NICHP, U.S. Naval Medical Research Unit 3, et al.) *Meeting Minutes*. April 2, 2001.

HM/HC Indicators. Full Set.

HM/HC. *Proceedings: Semi-Annual Coordination Meeting*. November 1999.

Information and Decision Support Center. *Technical Proposal: HIS Development System, MOHP*. Information, Technology Institute. The Cabinet. January 17, 2001.

Jaramillo, Snyder. *Family Planning MIS Development; the Egyptian Experience, A Look at the Management Information Systems Implementation Activities at the Egyptian Family Planning Institutions*. August 1998.

John Snow, Inc. *Healthy Mother/ Healthy Child Results Package, Development of Decentralized Management and Health Information System*. 1998–2001.

John Snow, Inc. *Healthy Mother/Healthy Child Results Package, Annual Work Plan, Contract Year IV, March–September 2001*. March 15, 2001

_____. *Guidelines for Planning and Monitoring, A Guide for the District Health Authorities*. Healthy Mother/Healthy Child Results Package. December 1998.

Knowles, H. and Bainbridge, K. *Sustainability Options for USAID/Egypt's Health and Population Program*. Measure (II) Evaluation. Draft. February 1999.

List of Information Systems Projects in MOHP. (one page summary table)

Memorandum of Cooperation for HM/HC and Population/Family Planning and Reproductive Health, between USAID/ Egypt, HMHC, and Pop/ FP.

Ministry of Health and Population. *NICHP Strategic Plan, Year 2000–2001*. June 2000.

_____. Ministry Decree No. 29 for 1998 (on Integration of Information Units).

_____. *Healthy Egyptians 2010, Maternal and Child Health Objectives*.

_____. *Indicators for Maternal and Child Health Care, Egypt.*

_____. *Basic Essential Obstetric Care, Service Standards.*

El-Zanaty, Way. *Egypt Demographic and Health Survey 2000.* MOHP, National Population Council, and ORC Macro. January 2001.

Nandakumar, Abdel-Latif and El-Beigh. *Options for Financing Health Services in the Pilot Facilities in Alexandria.* Technical Report No 36. August 1999.

Nandakumar, N., Ibrahim, E., and Abdel-Latif, S. A. *Health Expenditure Review: Alexandria, Egypt.* Technical Report No 35. May 1999.

Nassar Institute. *Seminar Report; Next Steps in the Integration of Preventive and Public Health Services in the Reforming Health Sector Using the Basic Benefits Package.* Technical Support Office. MOHP. October 2000.

National Population Council. *Annual Analytical Family Planning Services Statistical Reporting.* 1999.

Paterson, E., El-Beih, E., Fishbein, S., and Sallah, T. *Management Report: PHR Egypt 2000 Country Activity Plan.* February 2000.

_____. *Management Report: PHR Egypt 2000 Country Activity Plan.* Revision. February 2000.

Paterson, Pielemeier, Rafeh, and Conner. *PHR Trip Report: End of Project Workshop for PHR/Egypt.* March 2001.

Purvis, George. *Egypt: Cairo Curative Care Organization (CCO) Operational and Organizational Development Assessment.* PHR. Abt Associates. March 1997.

Sadiq, A., Sadiq, L., Beih, W., and Paterson, M. *Evaluation of the Demonstration Project for the Financing of Primary Health Care in Egypt.* January 2001.

Setzer. *Suggested National Health Sector Reform Strategies, Benchmarks, and Indicators,* Rollins School of Public Health. Emory University. PHR. June 1996.

Technical Support Office and PHR Resource Center. *A New Egyptian Health Care Model for the 21st Century.* 1999.

Technical Support Office. *Egypt Health Sector Reform Program.* December 1997.

Terrell, Mahfouz and Soliman. *Focus Group Results: Family Health Pilot Test in Alexandria, Egypt.* Technical Report 55. Abt Associates. May 2000.

Terms of Reference: *Development of a District Health Planning Model*.

United States Agency for International Development. *Strategic Objective 20*.

_____. *Advancing the Partnership, USAID/Egypt Strategic Plan, FY 2000–2009*. December 1999.

USAID/Cairo. *Memorandum of Cooperation for the Healthy Mother/Healthy Child Results Package; Population/Family Planning and Reproductive Health Results Package, District Information Centers*.

_____. *Results, Review and Resource Request, FY 2002 Program Overview and Annexes*. April 2000.

_____. Work Statement. JSI. Contract #263-C-00-98-00041-00.

_____. *Strategic Plan for Sustainable Improvements in the Health of Women and Children, Strategic Objective No 5 (SO5) 1995–2001*. April 1996.

_____. Work Statement. Pathfinder International. Contract # 263-C-00-99-00017-00.

_____. R4 Issues Memorandum. *SO4: Reduced Fertility*. January 26, 1998.

_____. *Results Package for Health Policy Support*.

_____. Maximus Contract Statement of Work

_____. Justification Memorandum HPSP Year Two. *MOHP Spending on Preventive and Primary Health Care et al*.

Villaume, Ezzat and Gaumer. *Study of Hospital Referrals in the Pilot Program in Alexandria, Egypt*. Technical Report 56. Abt Associates. October 2000.

World Bank Group. *Health Sector Reform Project, Project Appraisal Document*. summary from web site www.worldbank.org. April 1998.

Working Paper: *Family Health Facility Operation Manual, Process of Implementing Health Support Reform Program*.

PHR CD: Egypt Health Policy Support Project

- PHC Accreditation Program: Policies and Procedures Manual
- Accreditation Standards Assessment Monitoring System: Tutorial
- Tutorial: Beds Needs Model
- Policy Simulation of Inpatient Bed Needs

- Capitals Project Clearinghouse: a tool for tracking and prioritizing the flow of candidate projects
- Accreditation Program Support Tool
- PHR Egypt Consultant Trip Reports
- Family Planning Personnel Management System

ANNEX C
SCOPE OF WORK

MIS ASSESSMENT STATEMENT OF WORK

I. Background

The Health Policy Sector Program (HPSP) is a USAID/Government of Egypt (GOE) initiative designed to support significant health system policy change during a five year period from 1997-2001. This program began as part of the USAID/Egypt strategic objective 5 (SO5) "Sustainable Improvements in the Health of Women and Children", Intermediate Result 5.3 (IR 5.3) "Improved Environment to Plan, Manage, and Finance Sustained Maternal and Child Health Systems." The overall indicator for this component (IR 5.3) is "Percent of Ministry of Health and Population (MOHP) funding allocated for primary and preventive services."

The European Community (EC) and the World Bank (WB) have also been closely involved in the MOHP health reform program.

USAID/Egypt's recently approved Strategic Plan (2000-2009) calls for a final ten-year phase of assistance to the Population and Health (PH) sector. The Plan brings together in one objective what was previously two distinct PH strategic objectives - "Strategic Objective 20", Healthier, Planned Families" - with three complimentary Intermediate Results: (1) increased use of family planning, reproductive health and maternal and child health services by target population; (2) healthy behaviors adopted; and (3) sustainability of basic health services promoted. A detailed Transition Plan for the 1999-2009 strategy period to be developed over the ensuing months will define the program parameters, technical content, funding, and management arrangements for this final phase of population and health assistance.

Part of Strategic Objective 20 is to conduct technical assessments of its major existing results package activities to determine the "bridging" activities and mechanisms that will align them with the new strategic objective. HPSP Management Information System (MIS) is one of the results packages to be assessed. The assessment team shall assess the HPSP MIS results packages.

- USAID has sponsored various programs to develop MIS support for the health sector; most have been sponsored through MOHP vertical programs or under affiliated agencies.
- The MOHP has a broad mandate: set health policy, collect and analyze health data (epidemiological duties), approve/monitor pharmaceuticals, monitor health quality/accreditation, act as an insurer/payer for contracted care, and be a provider of primary through tertiary care.
- The objectives for the existing MIS efforts have been vertically focused and have not as yet had a mandate to focus across program areas or levels (delivery, administration, policy, etc., facility, district, governorate) on integration, communication or reuse of other systems.

II. Documents to review

- A. Prior to arrival to Cairo, the team shall review the following list of documents:
1. Applicable portions of contracts:
 - a.) John Snow, Inc.
 - b.) Pathfinder International
 - c.) MAXIMUS, Inc.
 2. Excerpts from Partnerships for Health Reform/Abt Associates, Inc. Research Triangle Report – 13 March 1997
 3. Organizational Chart for the Ministry of Health and Population
 4. Organizational charts of targeted organizations
 5. Overview of Healthy Mother/Healthy Child Results Package Management Health Information System Development
 6. Family Planning MIS Development, The Egyptian Experience
 7. Advancing the Partnership, USAID/Egypt, Strategic Plan
 8. MAXIMUS, Inc. Quarterly Progress Report, Q2 2000
 9. AIDE Memoire from EC support to the Health Sector Reform Program

II. Key questions to be answered

The team shall provide answers to the following key questions:

- A. What were the principal objectives of the MIS investments in USAID projects? Were they documented and shared? Were they achieved?
- B. Is the technology (hardware and software) being used appropriate and sufficient (operating systems are robust and supportable), database can handle the expected loads, LANs and WANs allow communication and have adequate up-time and response rates, recovery from failures (example – electrical outages) is technically possible?
- C. Are there potential economies of scale, through reducing or eliminating redundancies across some or all USAID funded health and population programs?
- D. What is the potential for sustainability after technical assistance contracts end? What are the technical assistance exit strategies? What are the critical factors involved in the above?
- E. Economies of scale v. autonomy. What would be the role of a centralized vs. decentralized MIS department for the MOHP (National Information Center for Health and Population [NICHHP])? Can NICHHP become the national data warehouse? Central v decentralized – how much activity can or should be supported centralized or decentralized? (Information on how other large-scale government agencies and large/multinational companies have answered this question would be useful.)

- F. What was the role of the other donors (World Bank, European Union) in developing MIS? Was coordination effective?
- G. Were the needs for shared information defined? Were the needs for this shared information defined at various level/branches of the MOHP and its affiliated organizations? Can these needs be met by simple data exchange? Is it time to consider a broader national mandate on health data exchange?
- H. Thoughts on future development of an MIS. What is the trade off between cost and cutting edge technology? Where does MOHP policy on MIS place that on the risk/cost curve? How much MOHP money was available to put into MIS and what are specific expected returns (cost control, quality of and access to services)? What technologies should MOHP look to utilize as it moves forward? (e.g. Web enabled applications, computerized medical records, etc.).
- I. Identify any constraints encountered that affected the achievement of the program objectives.

System Name:

Owner Department within MOHP or Agency/Department:

- J. **Basic Description of System (functional):** what functions does it support, what is the objective of its data collection, who are the users, where does it operate

Basic description of system (technical): operating system (clients and servers), database platform, standalone or network configuration, communication protocols, application development software, application developed by? source available?

Description of System Support: Who supports system now, how many people, what skill sets, what funding mechanism

Data collected is: Aggregate or Person/Patient Level

System designed to be: Batch (data entered from forms) or live (data entered at source)

Source of Data is: describe who provides the data, how it is collected,

Target of System: Who uses the output of the system? Is data sent anywhere else beyond the agency/department operating the system?

Future Plans: What expansion/changes are planned in upcoming year, where else do users see that the data could be useful (how do they see this system becoming interconnected)

IV. Output

The assessment team shall look at the objectives and planned outputs for each component, the approach adopted, and the results obtained to date. A comparison will be made between those activities originally planned for, and those activities actually carried out to date.

The expected outcome shall be a written report including a comprehensive analysis based upon specific examples to document the progress to date and the current status of the Health Sector Support Program's (HPSP) MIS. The report shall address the key questions noted above, assess the state of health management information systems, including strengths and weaknesses. The report shall present a concise and clear summary of its findings, and any recommendations to USAID. The report shall be final and complete when it is deemed acceptable to USAID/Egypt.

Under the guidance of the assessment team leader, the teams will keep USAID apprised weekly of the assessment teams' progress towards the end results, including the most salient issues or problems encountered.

V. Planned Site Visits and Interviews

The team shall conduct visits to:

- El Hilal Hospital
- Nasser Institute Hospital
- Heliopolis Hospital
- Health Directorate of Giza Governorate
- NICHP
- Seuf Health Clinic
- Abu Qir Health Clinic
- John Snow International, Inc.
- Controlling Endemic and Emerging Diseases (CEED)
- MOHP Directorate of Communicable Diseases/Epidemiology and Surveillance Unit
- Pathfinder
- HIO Family Health Fund/Stanley
- HIO Central MIS facility
- CCO Headquarters
- MOHP Directorate of Planning

B. The team shall conduct interviews with:

- Director General of NICHP

- PHR COP
- MAXIMUS COP
- MIS Directors at:
 - Nasser Institute Hospital
 - El Hilal Hospital
 - Heliopolis Hospital
 - Seuf Family Clinic
 - Abu Qir Family Health Center
 - HIO - Heliopolis
- HIO MIS Director
- CCO MIS Director
- USAID Project Management Assistant
- Pathfinder MIS Adviser
- John Snow International, Inc., Deputy COP for Management Services
- U.S. Naval Medical Research Unit: Medical Sciences Officer
- Director of the MOHP Directorate of Communicable Diseases/Epidemiology and Surveillance Unit

In all of these site visits and interviews, translation services will be provided as needed.

Cairo based resource persons are:

USAID Population and Health (PH) Office staff

Ministry of Health and Population (MOHP) resource person(s)

Time Frame

The MIS assessment will start in Cairo as soon as possible.

- Prior to convening in Egypt the team will review key documents and reports provided in advance of travel to Cairo.
- In conjunction with USAID/Egypt and PHR, the team will develop an assessment schedule that includes a list of individuals to be interviewed and sites to be visited, meet with relevant partners in Cairo and be briefed by PHR.

A team of two persons will be contracted, for the MIS assessment. A six days workweek will be authorized for the two contractors while in Egypt. One of the contractors will work for an additional 5 days in the U.S. to finalize the two reports.

VII. Qualifications Required:

The Health MIS Assessment Candidate will have the following qualifications:

The candidate shall:

- Have a minimum 10 years of experience in the design, implementation and evaluation of MIS programs, preferably in health care.
- Proven track record of strong needs analysis, analytical and conceptual skills.
- Clear, strong, concise writing skills.
- Minimum 2-5 years health care (public) MIS experience
- Knowledge/experience with multiple health care information systems.

It is desired that the candidate would have:

- Prior significant experience in health policy reform – in developing countries, particularly in the Middle East.
- Past experience and knowledge of USAID health policy activities (Egypt in particular).

ANNEX D
RECOMMENDATION MATRIX

	Subject/Issue	Recommendations	Comments
Immediate Needs	Complete and Coordinate Ongoing Activities	1. Complete Health Policy Pilot Systems Contract local firm to re-engineer PBS, Abu Qir model, under TSO Contract local firm to redesign implement PRS for FHF under TSO Support information technology procurement for Menufiya, Sohag, and Alexandria expansion with TSO, donors	
		2. Complete Hospital MIS Match MOHP commitment (budget and staff) with USAID local technical assistance contract	
		3. Coordinate Current USAID Health, Population, and Nutrition Projects Prohibit equipment duplication or incompatibility at same sites Set and enforce software development guidelines Consolidate information technology support	
Medium Term	Uniform Standards	4. NICHIP Sets Standards Technical assistance for standard codes for disease, pharmaceuticals, and supplies Technical assistance for standards for software development and data transfer	
	HIS Nationwide Automation	5. Re-engineer HIS and Rollout to Remaining Districts Use existing data collection; do not redesign Local technical assistance for software development and support Include hospital data, HIO, and health policy pilot	
Long Term	Support Decentralization and Innovative Financing	6. Strengthen District Use of Information for Management Reinforce existing systems; do not create new ones Involve district management teams in new financing models	
		7. Support Financing Models that Build Purchaser Provider Models Local experts for system development and support Modules for facility management, self-monitoring and evaluation, and HIS reports	
		8. Investments in Information Technology No investment in data warehousing Invest in HIO patient records and facilities management; co-ordinate w/ WB	
		9. MIS Benchmarks Must Reflect Outcomes Rather than Modules	

